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ABSTRACT

In this paper several instances in which a mirror-image (or "directionless") rule was added intact to an innovating grammar are presented, and it is argued that the form of such rules can be constrained in a special way. The author has found it necessary to distinguish rules added to an innovating grammar (diachronic rules) from rules already present in a grammar (synchronic rules). The author gives two examples of diachronic directionless rules which are also assimilatory. He acknowledges that there are diachronic assimilatory rules which are directional but feels there is a close intuitive connection between assimilation and directionless spread of articulatory features. He postulates that all diachronic nondirectional rules are basically assimilative in nature. (DO)

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DIRECTIONALITY AND ASSIMILATION:

evidence from the history of Portuguese

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Bach (1968), Kiparsky (1968), and Langacker (1969) have pointed out many examples of synchronic phonological rules which operate in mirror-image environments and have argued that abbreviation of the sequence of rules

(1) $A \longrightarrow B \;/\; c_1c_2 \ldots c_n \;__\; d_1d_2 \ldots d_m$

$A \longrightarrow B \;/\; d_m \ldots d_2d_1 \;__\; c_n \ldots c_1c_2$

by the notation

(2) $A \longrightarrow B \;/\; c_1c_2 \ldots c_n \;__\; d_1d_2 \ldots d_m$ *

reflects a linguistically significant generalization. (In case m or n is zero the environment bar may be simply deleted). As evidence in favor of this convention Bach (1968, p. 139) has cited a clear instance of a diachronic generalization in which the innovated form of a phonological rule is derived by change of the environment to mirror-image (or "directionless") form.

In this paper several instances in which a mirror-image rule was added intact to an innovating grammar will be presented, and it will be argued that the form of such rules can be constrained in a special way. For reasons which will become apparent it is necessary to distinguish rules added to an innovating grammar ("diachronic rules") from rules already present in a grammar ("synchronic rules").

The paradigm example of a directionless diachronic rule in Portuguese involves historical developments of

the type:

(3) Lt sagĭttam 'arrow': saéta (>*saɛ́ta) > OPtg sɛ́:ta

(4) Lt sōlam 'alone' (f.): sóa (>* sɔ́a) > OPtg sɔ́:

The starred forms are unattestable since Portuguese orthography of the period did not distinguish between [e] and [ɛ] or [o] and [ɔ]. In (3) the stressed close mid vowel e < Lt ĭ is lowered to ɛ by the a on the left, while in (4) stressed close o < Lt ō is lowered to ɔ by the a on the right. This may be written formally as:[1]

(5) [-high] > [+low] / [+low],

where deletion of the environment bar is sufficient to indicate the mirror-image property.

In (3) the a is then fronted to ɛ by the ɛ on the right and in (4) a is rounded to ɔ by the ɔ on the left. Both of these processes are quite general and may be written with mirror-image environments (cp: Lt majōrem maór > mɔ:r), but occur only if the environment vowel is low and the affected vowel is not high. Formally we have:

(6) $[-\text{high}] > \left\{ \begin{matrix} [-\text{back}] \\ [+\text{round}] \end{matrix} / \begin{matrix} [-\text{back}] \\ [+\text{round}] \end{matrix} / [+\overline{\text{low}}] \right\}$,

where the superior environment bar in the second environment indicates that the specification [+low] is to be added to each of the first environments.

Rules (5) and (6) can be collapsed as:[2]

(7) $[-\text{high}] > \left\{ \begin{matrix} [+\text{low}] \\ [-\text{back}] \\ [+\text{round}] \end{matrix} / \begin{matrix} [+\text{low}] \\ [-\text{back}] \\ [+\text{round}] \end{matrix} / [+\overline{\text{low}}] \right\}$.

All evidence indicates that (7) was either added to the grammar as a block or, perhaps, in the steps represented by (5) and (6). Furthermore, since this rule never became productive in the native Portuguese vocabulary[3] it has not undergone any processes of generalization in real time. It is, so to speak, an example of a directionless rule in an uncorrupted state of diachronic purity. As such, it is striking that the rule is assimilatory.

The dental palatalizations provide another example of a directionless diachronic rule.[4] As is well known, the dentals palatalized at an early date both before the palatal glide (exs: Lt <u>seniōrem</u> 'older' > Ptg <u>senhor</u> [seɲór][5] 'gentleman', Lt <u>filium</u> 'son' > Ptg <u>filho</u> [fíʎu] 'son') and after the palatal glide (ex: Lt <u>pulsare</u> > [puysár] > [puyšár] > Ptg <u>puxar</u> [pušár] 'to pull').[6] Furthermore, developments of the type Lt <u>apĭcŭlam</u> 'little bee' > /abekla/ > Ptg <u>abelha</u> [abéʎa] 'bee' and Lt <u>coxam</u> [kóksa] 'hip-bone' > Ptg <u>coxa</u> [kóša] 'thigh' can be brought under the same generalization by postulating that velar palatalization, that is, the fronting of velar [k] $\overset{\text{palatal}}{\wedge}$ to [k_1], operated before non-back consonants as well as before non-back vowels and glides. Then we would have intermediate stages of the type <u>abekla</u> > <u>abekl_1a</u>, <u>koksa</u> > <u>kok$_1$sa</u> and the dental palatalization rule could be written:[7]

(8) $$\begin{bmatrix}+\text{cons}\\+\text{cor}\\+\text{ant}\\-\text{dist}\end{bmatrix} > [+\text{high}] \;/\; \begin{bmatrix}-\text{voc}\\-\text{back}\\+\text{high}\end{bmatrix}$$

(The segments l s n palatalize adjacent to non-vocalic palatal segments, i.e., y and k_1). Once again we have a diachronic directionless rule which is also assimilatory.

Despite the evidence of (7) and (8) it is necessary to recognize that there are diachronic assimilatory rules which are directional. One example is the earliest known form of the velar palatalizations, with the environment restricted to y:

(9) $$[-\text{son}] > [-\text{back}] \;/\; __ \begin{bmatrix}-\text{voc}\\-\text{cons}\\-\text{back}\end{bmatrix}$$

(Since k is the only back obstruent, the rule simply fronts k to k_1 before y). The generalization referred to above was achieved in two steps by first removing [-voc] and then [-cons] from the environment.

There is, none the less, a close intuitive connection between assimilation and directionless spread of articulatory features. Furthermore, it is hard to imagine what else would give rise to natural directionless rules. Physiologically it is easy to see why the articulation of a given segment could have effects -- especially assimilatory effects -- on both surrounding segments. For this reason we postulate that all diachronic non-directional rules are basically assimilative in nature.

Unfortunately, apparent counter-examples come readily to mind. One very clear case is Oliveira's Law,[8] named after the sixteenth-century grammarian who discovered it. As a synchronic rule of nearly all dialects of Portuguese from at least the thirteenth century to the present day, this rule raises unstressed occurrences of mid vowels to high vowels on either side of another vowel. It produces alternations of the type:[9]

(10) moer [muér] 'to grind' : môo [móu] 'I grind'
flores [flóres] 'flowers' : caracóis [karakóis] 'snails'

In (10) the root vowel /o/ shows up as [u] when unstressed before a vowel but as [o] when stressed. Similarly, in (11) the plural ending /es/ is [es] when unstressed after a consonant, but [is] when unstressed after a vowel. Formally, the rule may be stated as:[10]

(12) $\begin{bmatrix} \text{-stress} \\ \text{-low} \\ \alpha\text{back} \\ \alpha\text{round} \end{bmatrix} \longrightarrow [\text{+high}] \;/\; V$

(Unstressed mid vowels are raised in position next to vowels).

Oliveira's Law is directionless, but obviously non-assimilatory. Since it seems to be diachronic as well as synchronic, it constitutes an apparent counter-example to the hypothesis advanced above. Upon close examination of the texts, however, one finds that

in the earliest attested manifestations of Oliveira's Law the environment is limited to the segment a. With a single exception[11] Sacks cites only examples of the type viniale < vinealem[12] or uav < vae (< vadĭt) in the dated Latin documents written in Portuguese territory. In traditional terms the change of e to i next to a would be considered a dissimilation, but this is not apparent if written out in the usual feature notation:

$$[-\text{low}] > [+\text{high}] \;/\; \begin{bmatrix} +\text{back} \\ -\text{round} \\ +\text{low} \end{bmatrix}$$

Oliveira's own nomenclature, re-interpreted as a rigorous feature system, is quite different. He considered the vowels i-e and u-o to be closely related pairwise in "orthography," that is, morphophonemics, and we can formalize this by assigning them a common feature, say [+height]. Similarly, Oliveira considered e-ɐ-o to share the property of narrowness, while i-u and ɛ-a-ɔ were all wide. This leads to the following formalization:[13]

	[-back]		[+back]
[+height, -narrow]	i		u
[+height, +narrow]	e	ɐ	o
[-height, -narrow]	ɛ	a	ɔ
	[-round]		[+round]

In this system Oliveira's Law restricted to a may be written:

(13) $$\begin{bmatrix} -\text{stress} \\ +\text{height} \\ \alpha\text{back} \\ \alpha\text{round} \end{bmatrix} > [-\text{narrow}] \;/\; \begin{bmatrix} -\text{narrow} \\ +\text{back} \\ -\text{round} \end{bmatrix}$$

As can be seen from (13), the original form of Oliveira's Law is assimilatory in a system which recognizes the traditional parameters open - close. In any case, it is important to note that the strictly diachronic version of Oliveira's Law is at worst a dissimilation and would therefore require only a slight modification of the hypothesis advanced above to allow for either assimilation or dissimilation.

If this hypothesis can be verified in a number of cases, it will be an example of a restriction on diachronic rules which does not follow from a corresponding restriction on synchronic rules. In fact, we can see that the restriction simply is not true of synchronic rules by inspection of (12) or any of the examples given in the three papers mentioned at the outset.

The history of Oliveira's Law instances one way in which a diachronic rule that obeys the proposed restriction can develop into a synchronic rule which does not. In essence, the development depends on no more than

the well-known process of generalization by loss of a feature from the environment portion of a rule, but in the case at hand it happens that the feature lost is the assimilatory one ([-narrow] in the example).

The same result can also be achieved by generalization of an originally directional rule to directionless form. For example, the loss of yod *after* high segments in Portuguese is attested long before the loss of yod *before* such segments (ex: first Lt *filĭum* > [fíʎvo] >Ptg *filho* [fíʎu], about a century later Lt *rŭsseum* 'red' > [roiso] > Ptg *roxo* [rósu] 'purple'). Thus, the generalization from

(14) $\begin{bmatrix} -\text{voc} \\ +\text{high} \\ -\text{back} \end{bmatrix} > \phi \; / \; \begin{bmatrix} +\text{cons} \\ +\text{high} \\ -\text{back} \end{bmatrix} \; \text{——}$

to

(15) $\begin{bmatrix} -\text{voc} \\ +\text{high} \\ -\text{back} \end{bmatrix} > \phi \; / \; \begin{bmatrix} +\text{cons} \\ +\text{high} \\ -\text{back} \end{bmatrix}$

produces a non-assimilatory directionless rule.

In view of the evidence given by rules 7, 8, and 13, the hypothesis of the assimilatory nature of strictly diachronic directionless rules seems reasonable. Furthermore, the occurrence of non-assimilatory directionless rules in synchronic grammars appears to be explainable on the basis of (at least) two well established non *ad hoc* mechanisms of generalization, as was shown in the development of Oliveira's Law and rule (14).

More generally, it may turn out to be the case that significant constraints can be imposed on the form of possible strictly diachronic rules, making them extremely natural from an intuitive point of view. Since all rules -- added or generalized -- must still be reflected somewhere in the speaker's competence, Halle's (1962) suggestion that added rules have the same form as synchronic rules would thereby be sharpened along the lines suggested by Kiparsky (1968, p. 16).

However, in order to find a reasonable explanation for the validity of the restriction proposed here one will have to turn to extra-grammatical factors since it has been shown that this restriction is not a consequence of any constraint on synchronic grammars. This result is hardly surprising, given the obviously physiological basis of most assimilatory phenomena, and shows, at least in one instance, why many facets of linguistic change "cannot be expalained by arguments drawn from purely internal relations within the system" (Labov, 1968, p. 259).

notes:

1. Actually the rule must be restricted to non-nasal vowels. Appropriate ordering eliminates the necessity of referring to stress. For a much more complete discussion and more examples see Naro, forthcoming a, part II.

2. The occurrence of the feature [+low] in the first environment of line 1, rule (7), may be omitted since it would be supplied in any case by the second environment.

3. Only two alternations are attested for the native vocabulary: sô [so] < Lt sōlŭm 'only' (masc.) : só [sɔ] < Lt sōlam 'only' (fem.) and avô [avó] < VLt *avŭlŭm 'grandfather' : avó [avɔ́] < VLt *avŭlam 'grandmother'. The first of these was eliminated by a development discussed in Naro, forthcoming a.

For the borrowed vocabulary one can cite certain erudite Latin forms such as the adjective sagital 'having the form of an arrow' or the noun solidão 'solitude'. Some of these, like sagital, are strictly dictionary words which enter speakers' vocabularies very late, perhaps after the loss of the faculté du langage. Others, like solidão, are more popular, but not numerous in the statistical sense. It is, therefore, not at all clear that rule (7) is productive even in relating borrowed to native vocabulary.

4. This rule is more fully discussed in Naro, forthcoming b.

5. In general, irrelevant phonetic details are omitted from the transcriptions in square brackets.

6. Meyer-Lübke's hypothetical *pulsiare (1890, I.436) seems to be nowhere attested, and he himself abandoned it in REW^3, item 6837 (1935).

7. Changed features other than high are provided by marking conventions.

Notice that no phonetic reality need be attributed to forms like abekl$_1$a or abekla since rule (8) and the generalized version of rule (9) were probably in the grammar before the loss of the unstressed penault. This would explain Y. Malkiel's notion of "palatalization upon impact" (personal communication).

8. For a fuller discussion see Naro, forthcoming a.

9. In Modern European Portuguese the rule is productive only for e since all unstressed occurrences of o subsequently became u. Similarly, in Brazil the effects of the rule are obscured by later rules in post-tonic position, but are still clearly visible in pre-tonic position. None of these subsequent developments force one to restrict Oliveira's Law in any way, although its surface effects become less obvious because of the overlay of other rules.

10. I assume the usual analysis of vocalic features and the presence of ɐ ("close a") in underlying representations. The latter assumption is not critical here; without it the specification $\begin{bmatrix}\alpha\text{back}\\ \alpha\text{round}\end{bmatrix}$ could be removed from (12).

11. The exception is boi < *boe < bovem, but the development of this item is in any case exceptional because of the loss of v.

12. As suggested by Malkiel (1942, p. 295), it is quite probable that orthographic viniale represents phonetic [vinɟále], but the [ɲ] would presuppose an earlier [ny] < [ni]. A direct development of the type [ˈne] (> [ˈnɛ], with a mid glide) > [ˈny] does not seem to be tenable here for two reasons: (1) there would be no natural way to explain the occurrence of the change first next to a, later next to other vowels, (2) words in which the preceding consonant could not palatalize do not have glides in most modern dialects (exs: leónem > [liáũ], not [ʎáũ] or [lyáũ]). Furthermore, I do not know of any cases in which a word like criar < creare could count as one syllable in the early poetry. In general, it seems to me that glides could be formed only after the development of high vowels.

13. The features used here for vowel height are equivalent to one of the systems suggested by Wang (1968, p. 701) for a three height system. See his paper for justification within a generative framework.

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